SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

No. 1778.—Vol. XXXIX. LONDON, SATURDAY, SEPTEMBER 18, 1869. {STAMPED .. SIXPENCE. UNSTAMPED. FIVEPENCE.

Original Correspondence.

THE HEATON PROCESS OF CONVERTING CAST-IRON.

Sir,—In the course of trials made of the Heaton application of nitrate of soda to the purification and to the conversion of cast-iron, it has been asserted that "the process is uncertain in its operation." There is in this statement a tissue of truth and error which, in the interests of chemical science applied to the metallurgy of iron, and of intending inventors, it is highly important to disentangle. I, therefore, request you to afford me space in your useful columns to do so. If it be intended to state that there are some kinds of cast metal which altogether defy the reactions of nitrate of soda as a purifier and concocter, the statement is correct; but it ought, in fairness to the inventor, to be made in those express terms. The fact is that no chemical re-agent will altogether succeed with such kinds of metal, and the reason is very simple. Certain kinds of metal, principally from the want of sufficient carbon, pass into the semi-pasty state so rapidly that the chemical substance employed ceases to act, except very feebly, upon the surface of the mass, and this whether it be nitrate of soda or any other chemical re-agent. The objection, therefore, whatever it be worth, is not confined to the Heaton process. In order to treat such kinds of metal with a chance of success they must be kept by some means in a fluid state until the chemical action is completed, in which respect, though at a great sacrifice of metal and of ultimate yield, the method adopted by Mr. Bessemer has an undoubted advantage. But, omitting for the moment all reference to such supplementary means, especially as I happen to be personally interested in their application, there is a question which all inventors of strictly chemical methods of refining and conversion are entitled to ask—"Why are we to be called upon at all to treat such kinds of metal successfully before our methods are to be accepted by the trade for the great majority of cases in which they do succeed? Those peculiar kinds of metal have been produced solely with a view to their more economical treatment by the puddling process, and they ought to be restricted to it; at least, until we have had time to find means of treating them chemically. But this supposes that we need not trouble ourselves with them at all. If our chemical methods of refining and conversion are successful in all cases of metal which retains its fluidity during the operations, and if also they are the most economical, then will cast metal of a proper description, suitable especially to our processes, be produced expressly for our purpose, and this by the simplest change possible in the charges of the blast-furnace, just as forge-pig is now made for the puddler." I have good reasons for stating, with the greatest confidence, that metal rich in carbon and long retentive of fluidity will, in point of yield, as well as of quality, be found to be the most economical sort for chemical treatment.—*Ryde, Sept.* 13. F. C. Knowles.

THE SOUTH STAFFORDSHIRE AND SHROPSHIRE COAL FIELDS—No. XV.

Sir,—I purpose turning now to see whether a more hopeful side of the picture is to be found near the north-north-east termination of the latter field, which will be familiar to the reader who has observed it on the map under the form of an elongated triangle, one side of which is marked as the east boundary fault, which is represented as joining the Lightmoor fault opposite the Lodge furnaces. When the coal field was so mapped, however, the east fault was represented, both by Government surveyors and by Mr. Prestwich, as a slip fault or fracture, something like the Lightmoor one; but this having proved a myth—excepting so far as denudation is concerned—this side of the field will require considerable modification on the map. The Lightmoor, the longest and best defined fault in the field, which extends from Coalbrookdale to a point north-north east of Lilleshall Hill, causing a difference of level at Lightmoor of 300 ft., at Dawley of 500, Malinslee of 700, and Snedshill of 300, sends out others in its course, one of which, starting from St. Georges, runs into the west boundary fault, on approaching which it splits into several divisions. At the Muxton Bridge pits, a little north-north-east of where the Lightmoor fault thus sends off some of its branch fractures, Mr. Edward Jones, as shown by a recent paragraph in the *Mining Journal*, has succeeded after much perseverance in crossing this line of disturbance, with no other inconvenience than that of finding the fungus facing the gur coal, and there would seem to be no reason why not only this coal, but all the coals lower down should not continue under the Permian strata to Lilleshall Abbey, and even miles beyond; unless, indeed, it should so happen that denudation has reached thus far, and cut them out. Take, again, the Crow Hay pits, sunk some years ago through the Red rocks in search of limestone, but in which the workmen came down upon the Pennystone and lower coals. These pits are the same distance east of the Lightmoor fault as the Granville, but whilst the depth at the latter to the clod coal is 400 yards, the depth to the same coal at the former is only 150. At the Granville you have the entire series of coals running east of the Lightmoor fault horizontally, whilst at the Crow Hay you only get the lower coals dipping away from the hill, the chief point of disturbance, at the rate of 1 in 7. The coal field here is known to be entire from the Granville to the Crow Hay, minus small faults, and it seems only reasonable to suppose that by sinking further from the hill the measures would be found assuming their natural horizontal positions, and possibly the upper coals coming in one after another till the Granville series became complete. This would be very satisfactory but for the fear that we may meet with the estuary to the east. It may be difficult now to ascertain exactly the true character of the strata the sinkers went through at the Crow Hay; if it was, as it is generally supposed, the true Permians, I confess that the fact of this set of strata being found resting on the lower members of the Old Coal Measures makes the case look very suspicious, and I, for one, shall begin to fear that the men at the Granville Pits have serious cause to begin to look out soon for some indication of this old line of denudation to the east. Let us hope it may not be so, but that large tracts yet lie undenuded beneath the Permians and New Red Sandstone rocks, awaiting sufficient enterprise to bring the contents to the surface. So far, at any rate, evidence seems to favour some carefully-selected spot for a trial boring, so far as this coal field is concerned, very much north of Watling-street or Sheriff Hales.

A trial in this direction, referred to by me in the *Mining Journal* some time ago, was made by Mr. Boultbee, of Chatwell, who went down 188½ yards, through New Red Sandstone strata, consisting of 27 feet of calcareous conglomerate and sand rock, 100 feet of brick-red sandstone, 100 feet of sandstone with conglomerates, 100 feet of brown and red sandstones, together with a number of deep red marls and clays, described as bull's liver by the men. At the invitation of Mr. Boultbee I visited these borings, and from him I understood that the only reason of his abandoning the attempt was the water and the expense; but that he would afford every facility to any individual or individuals who would undertake to continue the boring, which is still, I believe, carefully plugged up. As a section of the strata at this point might be of use in any future exploration, I give it:—

Mr. Boultbee's Borings at Chatwell, made June, 1852.

The thickness of each strata in the borings:—

Ft.	In.	Name of Strata.	Ft.	In.
		Depth of quarry	27	0
4	0	White and red shale	31	0
12	0	Red rock	43	0
1	0	White rock	44	0
18	0	Dark rock	62	0
19	0	Dark rock (water)	81	0
5	0	White rock	86	0
11	0	Red rock	97	0
1	6	Light and red rock	98	6
7	0	Light red sharp sand....	105	6
3	0	Grey hard rock.....	108	6
7	0	Fine red sand	115	6
4	6	Grey rock.....	120	0
6	0	Fine red clay.....	126	0
8	6	White sand (water).....	134	6
18	6	Dark clay.....	152	6
9	6	White rock (water).....	162	0
23	0	White and red rock.....	185	0
1	6	Dark red rock	186	6
11	0	White and red rock.....	197	6
0	6	White clod	198	0
7	6	Motley rock	205	0
3	0	Bull's liver	208	0
7	0	White clod	215	0
9	0	Dark red loam	224	0
4	0	Red slum.....	228	0
1	0	White rock	229	0
11	3	White and red rock.....	240	3
23	6	Dark red clay.....	263	9
4	6	Light red clay	268	3
4	0	White clod	272	3
22	6	Soft brown rock	294	9
12	0	Hard brown rock	306	9
9	0	White hard rock	315	9
1	6	Blue clod.....	317	3
6	0	Brown rock	323	3
1	2	Blue clod.....	324	5
0	10	Brown slum	325	3
1	0	White hard rock	326	3
1	6	Brown slum	327	9
3	6	Blue clod	331	3
17	6	Brown rock.....	348	9
0	6	Brown slum	349	3
16	0	Grey hard rock	365	3
11	0	Brown rock.....	376	3
1	6	White clod	377	9
6	10	White rock	384	7
1	2	Blue clod	385	9
11	8	White hard rock	397	7
0	7	White clod	398	2
3	1	White and dark rock	401	3
0	9	Clay (Coals)	402	0
9	4	Dark white rock	411	4
2	9	Dark and white clay	414	1
25	2	White rock	439	3
0	6	Blue clod	439	9
10	4	Dark and light rock	450	1
3	4	White and dark rock	453	5
0	6	Blue clod	453	11
6	0	White and dark rock	459	11
2	1	Peldon, or ironstone	462	0
0	1	Bull's liver.....	462	1
2	6	Blue clod	464	7
27	5	White and dark rock	492	0
1	0	White clod	493	0
31	8	White and dark rock	524	8
0	10	White clod	525	6
22	9	White and dark rock	548	3
9	0	Fine dark rock	557	3
8	3	Fine dark and white rock	565	6

Total depth of boring, 188½ yards.

Madeley, Salop, Sept. 15. J. Randall, F.G.S.

COAL-CUTTING MACHINERY.

Sir,—From the illustration you gave in the Supplement to last week's Journal one is able to see what Mr. J. S. Walker, of Wigan, is trying to do; but I am afraid it will be like many others before it is of much use, although you state it is doing 30 yards per hour. Besides, I think Mr. Walker will find, if he looks over the patents, the same thing has already been done over and over again. Even if the machine can be made to do a sufficient quantity of work, its sizes are so unlikely for a pit bottom that it cannot become a general machine; as, according to the sketch, the cutting-wheel must be 7 ft. diameter to enable it to cut a groove 3 ft. deep in the coal. The gauge of the road on which the machine runs is 3 ft. 6 in., and the whole length of the machine will be upwards of 10 feet. Certainly it is not very high, but the idea of a place 10 ft. by 7 ft., which will be requisite for the machine to commence working, and having to be turned round at the end of the stall, having the running-wheels 7 ft. or 8 ft. apart.

I have paid much attention to these machines, and if this one be an improvement over what has already been done, I am afraid we shall not have it generally adopted—yet I had sometime since begun to think, after Mr. Rothery was talking of introducing a small portable machine that could be set to work almost in any kind of place, whether a road was laid or not, there was some chance of the most laborious part of the colliers' work being done by machinery, but if this arrangement is considered an improved one over what has already been done, I begin to despair.—*Barnsley, Sept.* 16. A Miner.

COLLIERY WORKING, AND EXPLOSIONS—No. III.

Sir,—It is clear that the various districts of a mine require the utmost care and attention, in order to keep them in a safe working condition, both as to keeping the works clear of explosive gas and choke-damp, and also the roof safe by timbering. It is also conceded that, in order to work a fiery mine safely, the discipline must be almost equal to military discipline in its character. In order to do this the men must be divided into companies, each of which must be under the control of an officer, otherwise it will be impossible to keep up anything like discipline.

Supposing for a moment that you have 200 men in a pit, all engaged in getting coal, with the exception of the roadmen, the coal getters to put up their own timber, get their own plates, &c. What can a solitary *fireman*, or two, do amongst such a multitude, but make his rounds, and *advise* the men to do so and so? It must be extremely comfortable for a stranger visiting such a place to know that gas is sometimes found, and also that most of the men are provided with a can of powder for the purpose of blasting the coal when they choose to do so.

It will hardly be considered of much consequence whether the men blast on *both* or only on *one* side of the bord; such nice distinctions are idle. No doubt many colliery owners and managers consider that it is more economical to put all the work, or nearly so, on to the coal getters; but this is by many experienced men considered a fallacy, and it certainly does not agree with the general practice in nearly all factories or other works, where the division of labour is carried out to the utmost extent, and, it is understood, with the best results. At any rate, it is quite reasonable to suppose that deputies for districts, who not only take charge of the men and works in the absence of the superior officers, but also timber and plate the working places, will perform this work quite as cheaply as the coal getters The cost per ton is certainly not increased by employing these subordinate officers, while the power which they give of exercising proper supervision, and maintaining discipline, vastly increases the chance of safety. And, further, there is no doubt that this system enables the colliery proprietors to produce more coal than any other system—that is, a greater quantity of coal per shift or day—as any breakage of machinery, fall of roof, or other mishap has a better chance of being attended to at once, and a remedy applied.

In our very meagre list of officers employed the "masters' waste-man" is named. This is a most important officer, as he has charge of the whole of the air-ways and the ventilating furnaces: it is his duty to travel the air-ways daily, to keep them in a proper state of repair, and to report to the viewer. He is a man, generally, of great experience, and is supposed to possess much practical knowledge of ventilation, and the planning of the mode of ventilating the workings in detail; and in many cases the general ventilation also is more indebted to his genius and knowledge than is generally supposed.

Newcastle, Sept. 13. M. E.

COLLIERY WORKINGS.

FOWLER'S CLIP DRUM AND PULLEY.

Sir,—I have read with much interest in your valuable Journal some letters signed "M. E.," Newcastle, on the underground haulage of coals, in which he speaks of the great value of Fowler's clip pulley and drum for that purpose. I shall be obliged if "M. E.," or any other reader, will inform me whether the clip drum would have sufficient grip on a wire rope, when driven by machinery, to start the wagon on a double incline road, when there is not sufficient weight in the full wagon on the top to start the empty one at the bottom, or, if required, to bring up a full wagon with an empty one descending. If so, by pulling, driving, and break gear, I am certain that there will be a great saving in erections and rope to what there would be with a common drum. I shall be glad also to know where Fowler's clip drum and pulley can be obtained. J. B.

Sept. 13.

PROGRESS OF COAL MINING IN THE RHONDDA VALLEY, SOUTH WALES.

Sir,—The collieries in the upper part of Rhondda Valley, from Dinas upwards, all produce steam coal, with two exceptions—the Bwlfa Colliery and Llwynpia, where the No. 3 seam is worked. The collieries producing steam coal are eleven in number, and two other companies are sinking to the same seams. Those on the west side of the valley comprise Dunraven, Bute Merthyr, Tylacoch, Park and Ton, Llwynpia, and Dinas Collieries; those on the east side comprise Tynewydd or Rhondda Merthyr, Ynisfaio, Abergorky, Pentre and Church, and Bodringalt Collieries. The two sinkings for steam coal are in Blaen Rhondda, a branch at the head of the valley, diverging to the east. Of one of these properties Messrs. Marychurch and Co. are lessees, and of the other, on the opposite side of the brook, Messrs. Lewis are the lessees.

At Dunraven Colliery, coal is got by level from the Graig or No. 2 seam, and is sold for house purposes. The principal part of the produce is got from the 4 ft. seam, at one pit. Another pit is now being sunk to the 6 ft. and 9 ft. seams, from which coal will shortly be raised. Bute Merthyr pits were the first sunk to the steam coal in the valley; at present the 2 ft. 9 in. and 4 ft. seams are got, principally the former. The 2 ft. 9 in. seam is also worked at Tylacoch. The Park and Ton Collieries, owned by Messrs. David Davies and Co., produce coal from the 4 ft. seam; about 500 tons are raised from each per day. There is a downcast pit 16 ft. by 12 ft., and an upcast pit 14 ft. by 12 ft. at each establishment, four screens, and 60 workmen's cottages; the upcasts are used solely for ventilation. Another pit is being sunk to the 9 ft. seam, near to the Park Colliery; it is now 160 yards deep, and has passed through the 2 ft. 9 in., 4 ft., and 6 ft. seams.

Tynewydd, or Rhondda Merthyr.—Messrs. Lewis lessees. Two pits are sunk to the 6 ft. seam, 272 yards deep. These are situated up the hill side a great height, in order to avoid a dip to the east which occurs across the valley and into the hill eastward. The dip, however, still continues eastward from the pit 250 yards, and then the measures run level. A hauling engine on the top of the pit, which was used as a sinking engine, draws the coal up this rise of 250 yards in the 6 ft. seam: it has an 18 in. single horizontal cylinder, 3 ft. stroke, on second motion; the empty trams run down with the rope. The 4 ft. seam is reached by a rising stone drift from the 6 ft. seam, and the 2 ft. 9 in. will be got by a stone drift from the 4 ft.; all will be brought to the level of the 6 ft. seam. About 200 tons per day are raised at present from the 6 ft., but 600 tons are intended to be raised when the three seams are in operation. The winding-engine has two 27 in. horizontal cylinders, 4½ ft. stroke, direct-action, 40 lbs. pressure, slide valves, 11 ft. drum for round wire-ropes, two boilers; water is drawn at nights with this engine by a tank from the sump. The downcast pit, where coal is raised, is oval; the other pit is round, used exclusively as a furnace upcast. The produce from this colliery is lowered by a self-acting incline, on a steep gradient, to the screen at the Taff Vale siding.

Ynisfaio Colliery produces the 4 ft. steam coal: this was formerly raised by a water-balance, and a pumping-engine was required to pump up the balance water; these have been cleared away, and a winding-engine substituted, of two 25-in. horizontal cylinders, which raises coal, and water also at nights by tank. The Pentre and Church Collieries have lately been purchased by Cory Brothers and Co.; the estates are 513 acres in area; coal is raised from the 2 ft. 9 in. seam by a winding-engine; no pumping-engine. The Abergorky seam is worked to a small extent. The Bodringalt Colliery also produces the Abergorky coal, got by level: two pits are sunk to the 4 feet seam; one engine erected, but coal is not raised at present from the latter seam.

Blaen Rhondda.—There are two pits in process of sinking for steam coal, 40 yards apart: one pit, downcast, 17½ by 11½ feet, has passed through the 2 ft. 9 in., the 4 ft., and 6 ft. seams, and is now over 380 yards deep, and approaching the 9 ft. seam; the other pit is for an upcast, is circular, 12 ft. diameter; it is now 240 yards deep, the Abergorky seam passed through at 180 yards. Both pits are walled wholly with fire-brick, 9 in. thick and upwards; the fire-bricks are made on the premises, with the underclay from No. 2 seam. A lodge-room, at the depth of 65 yards in the large pit, collects water at the principal spring met with in sinking, which is now raised by an engine with 9-in. pumps, in one forcing column. The ventilation of the two pits is caused by drifting between them at intervals, and bratticing from thence to the bottom of the pits. There is not any large amount of water met with below the feeder at 65 yards; the springs have usually decreased greatly after running awhile.

Engines, Winding and Pumping.—One winding at the large pit has two 30-in. horizontal cylinder, 5-ft. stroke, 13-ft. drum, for round wire-ropes, direct-action slide-valves, 40 lbs. pressure, three boilers. This is now used for sinking. The winding-engine, at the 12 ft. pit, has one 25-in. horizontal cylinder, 4-ft. stroke, second motion, now used for sinking. These engines are placed in stone buildings, parallel to each other, or 40 yards apart, and are both designed

for raising coal. The pumping-engine at the large pit was first used as the sinking-engine for it; it has one 18-in. cylinder, 3-ft. stroke, second motion, cog-wheels for pumping apparatus 5½ to 1, connected by rod and bell crank to the pump-rod. One portable engine, now unused, double cylinders, power increased 8 to 1 by cog-wheels. The 12 ft. pit was sunk 160 yards with this engine, raising both stones and water in buckets. One small horizontal cylinder drives mortar-mill, rolls and pug-mill for grinding and tempering fire-clay; the bricks are burnt in two close kilns. No. 2 seam is worked by level in the hill side near the pits, and produces coal for the supply of the engines, and the under-clay is used for brickmaking. These are sent down to the works by a self-acting incline. Another incline is used for lowering stone got from under No. 2 seam. A railroad is laid from the Taff Vale terminus to Blaen Rhondda pits, nearly one mile long, on the surface, of bridge rails, about 18 lbs. per yard, 3-ft. gauge. The engines, boilers, and other materials have been brought on this railway to the works; the boilers were brought in parts, and put together after they got to their destination. Messrs. Lewis, the owners of Rhondda Merthyr, have commenced two pits to win the steam coals on the adjoining property to that of Messrs. Marychurch and Co. The pits are sunk to the stone-head, 25 yards, and walled; the size of one is to be 17½ by 12½ ft., and of the upcast 16 by 12 ft. Both are designed for raising coal. The pits have been sunk, so far, with windlasses, and are standing now until the permanent winding-engines are erected. An engine of two 30-in. cylinders is ready for sending to the place. A railway is projected by a company to be made from these collieries to join the Vale of Neath Railway. A long tunnel will be required to go northward through the hill. The railway would give access to Swansea and other ports from these and adjoining collieries.

VENTILATION AND SYSTEM OF WORKING IN THE RHONDDA.—Each colliery has a downcast and an upcast pit, the latter for furnace ventilation; no mechanical means of ventilation has yet been adopted. The smoke arising from the colliery upcasts in the steam coal district is scarcely perceptible, contrasting forcibly with the volumes of smoke which may be seen issuing from the upcasts of collieries in the North of England. No great explosion of fire-damp has occurred in the collieries of the district under description, perhaps because it is somewhat less freely emitted than in the collieries near Aberdare, and is more easily under control, but much is due to the system of working the coal—that is, by long wall, and stowing up the vacancies as the work proceeds. At Dunraven Colliery and at Bute Merthyr engines are erected to raise the shale brought out of the pits to a height so as to form a tip; it is desirable to have this filled in underground; if there is not room sufficient to hold it the roads may be placed further apart to meet this without inconvenience, but if the slack or small coal were all sent up to the surface there would, in most cases, be sufficient room for the shale and fire-clay on the present arrangement of roads in the mine. In the Midland Counties the gate-roads are made 40 yards and upwards apart; this limits the expense of making roads, and the amount of shale and other material to be filled up; another arrangement of roads along the face is then required.

MINERS, AND THE COAL TRADE.—The working hours throughout South Wales are from 7 to 5 P.M. for colliers, hauliers, and boys. The firemen examine the several districts of a pit each morning, and when they come up the pit if they report all is right the men descend to their work; after performing a fair day's work they may come up again before 5, if there are a sufficient number to fill the carriage. The firemen in this district are paid 5s. per day, the colliers earn from 4s. to 4s. 6d. per day of 10 hours. They request to have protection from accidents, and in addition to this fair wages are due to them, and education is needed to give them the means of raising their social position, and living in comfort: these will, no doubt, come in time, when employers and workmen co-operate to forward and attain these results, so desirable for their well being. The present reduced rate of wages is owing to the unremunerative prices obtained for coal, the ruling price at Cardiff for some time has been 8s. per ton for steam coal, and this, when a large capital is to be redeemed, and the output of coal is small, is not very encouraging. It has been said that coalmasters should not sell at unremunerative prices, that they should combine to keep up the price of coal when the demand is not in accordance with the supply; we know this has been tried in the North of England collieries and has failed, either from a want of unanimity in the trade, or from the supply from other districts coming into competition with that which was sought to be regulated. In the present state of the trade the increase in contemplation of the supply of coal from new sinkings does not seem to be called for from present appearances, but we must hope that the extension of iron and other manufactures will give an impetus to the demand for coal, and remunerative prices and wages, without resorting to artificial restrictions.

Attention has been directed to the increased supply which has lately, and will further, be brought into the markets to swell the already over supply; it is desirable, however, that the production of coal should be kept within proper bounds, in accordance with the demand which is likely to arise for it. As a result of the present depressed condition of trade, and the diminished output of coal from the pits, miners have been thrown out of work in this district, and, not finding employment in the neighbouring districts, numbers have resorted to emigration throughout this year. The building trade, which was in a flourishing condition, has in the last twelve months declined. Cottage rents, which ranged from 4s. to 5s. per week, have also been reduced to meet the present state of matters.

There are two schools in the upper part of Rhondda Valley, and I suppose there are others towards Ystrad, as the population above Ystrad is stated to be 6000. Towards the schools and doctor the colliers and other workmen pay out of their wages 3d. in 1*l*. It would, no doubt, be considered by the workmen a great boon if the employers were to furnish the children with school books, and institute libraries and reading-rooms for the mental and moral improvement of their men, in addition to paying for the education of the children.

With regard to the future of colliery mining operations, we believe that the Legislature can do much to prevent accidents, and owners of collieries can also do much; but the greatest amount of good will be effected by the co-operation of careful underground agents and steady and discreet workmen, in adopting the most approved methods of working our mines in the first place, and carrying out those operations by a strict observance of the rules written for the guidance of all concerned in the working of mines. M. B. GARDNER.

Sept. 14.

THE NEW MOTOR—THE MAHOVOS.

SIR,—Although I carefully read the remarks of your Paris Exhibition correspondent at the time, and the article in last week's Supplement, I still fail to comprehend how any practical advantage can result from the arrangement in question. It is ingenious, no doubt, but I am not equally certain as to its utility. I saw the model at Paris, and admit that it worked well, but models often do—the circumstances are usually more favourable than are met with in practice, being, in fact, made to suit the machine. All that I can infer, either from your correspondent's remarks, or from those of Dr. Barnard, is that the mahovos accumulates power, and that the accumulated power can be substituted for the original power at pleasure. They both infer this distinctly, and I think they are wrong, however clever they may be upon general mechanical questions. If the mahovos will give us any power which it has not first taken from the prime motor, why should we not have perpetual motion? If the application of the power of eight horses during the whole journey is required to move a load 32 miles, do they mean to say that by using the mahovos the eight horses power would have to be employed but three-fourths of the distance? therefore, the work of eight horses would be done by six horses; or assuming the mahovos to be applied to mining engines of three-fourths the power of those now used could be substituted for those at present employed. Now, if one-fourth of the power be saved, it follows that one-fourth of the remainder could be saved with equal facility, and so on with any further remainder, so that the surplus could be applied as an original motor—this would prove the absurdity of the whole concern.

Now, I believe that the fact is, that during the time the original motor is at work more power than usual is used, and that it is this additional power which is utilised after the mahovos is brought into play, so that we should find that to perform a given amount of work as much power is used with the mahovos as without it. It seems to me unreasonable that a fly-wheel can give out any power that has not first been imparted to it; and, if it be admitted that this is so, I cannot comprehend what additional advantage there can be in expending the entire power upon the first three-fourths of the work, and the starting of the mahovos, as compared with performing the work in the ordinary way, without the mahovos. I think there is no question that we want to know something more of the mahovos before we advocate its adoption, for it certainly seems to me that the advantages claimed for it are more imaginary than real. ENGINEER.

Sept. 15.

MINING IN IRELAND.

SIR,—In the Journal of last week you adverted to the writers of the "Memoirs of the Geological Survey of Ireland," who appear to have done all in their power to prevent capitalists or speculators from undertaking any enterprise in the way of mining in the south-west of the county of Cork. Of course, those gentlemen did not intentionally wish or desire to say anything but what they believed to be true, but really these theorists should have been much more careful before they made the assertions they have in these Memoirs, which are calculated to give a most erroneous impression of the actual and known mineral veins of the district in question.

I was at Skibbereen three weeks ago, and having a few days at my disposal I was requested to visit the Cappagh and other mining properties. I can, therefore, from actual inspection fully confirm your remarks as to the formation of the mineral veins—*i.e.*, they are *not* formed of red sand, grit, copper sand, mud, &c.; but, on the contrary, the veins of ore are most distinct, and as regular as those of Cornwall, and the best proof of this is to be found in the great productiveness of such mines as Beerhaven, Browhead, Ballycummisk, Coosheen, Knockmahon, Cappagh, and others.

It is difficult to get at the exact figures, as these mines are, for the most part, being worked privately; but from reliable information, I am able to state that Berehaven has returned ores to the extent of 2,000,000*l*., and other mines, such as Knockmahon, and those mentioned by you, are equally productive. The Cappagh Mine, which is not now in work, has sunk a shaft on the lode down to the 90, every fathom of which yielded rich ore, the lode increasing in yield every fathom, and in the 90 has proved actually worth 70*l*. to 80*l*. per fm., and practical miners, not "amateur geologists," assert that these veins of mineral are as certain and as definitively formed as any in the best Cornish mines. It is a matter of astonishment that Cappagh should be allowed to remain idle; perhaps the Memoirs have had an evil influence, for it is certain that if such a property were in this country, or even in South America, it would be readily taken up, and the public asked to give something like 30,000*l*. for the privilege of being allowed to join in the venture. In spite of these Memoirs, however, fortunes will still be made in the mines of the South-West, and a few more examples will bring abundant capital to this part of the "ould" country.—*Sept.* 15. ERIN.

PROPOSED ABOLITION OF PATENTS.

"Recent Discussions on the Abolition of Patents." By R. A. MACFIE, Esq., M.P. London: Longmans. 8vo, p.p. 350.

No man knows better than Mr. Macfie, M.P. for Leith, who advocates the abolition of patents, that he thereby solely represents the manufacturing interests, and not those of the body politic: that is, when he speaks of the public, we must always understand him as only meaning the manufacturing public. Mr. Macfie's literary productions—his work entitled "The Patent Question under Free Trade," 8vo, 1864; and his "Recent Discussions on the Abolition of Patents for Inventions"—are written in precisely the tone of counsel who being engaged to argue on one side feels bound to admit no evidence that might be an advantage to an opponent. When scientific men act thus in affording evidence in cases of patent litigation, he speaks of such conduct as "the tendency the patent system has to lower the tone of men of science" (page 80), so that possibly from having been a patentee himself, he is only acting under the same evil tendency!

Whenever Mr. Macfie speaks of inventors, he argues that they make little or nothing by patents. When he treats of patents, he is always showing the worthlessness of their subjects, and, indeed, their general character; and yet these are made out to be a source of annoyance and heavy taxation of the manufacturing and trading interests! His own words (p. 3) in respect to patents are—

1.—"Their incompatibility with free trade." And—

2.—"The hardships they inflict on British manufacturers in competing with rivals in home, and especially in foreign, markets."

Lastly.—"No conceivable mere *improvement*, even though it should clear away the present encumbrance of a multiplicity of trifling patents, can be more than an *alleviation* of the mischief now done."

Mr. Macfie, as counsel for the manufacturing interests, chooses to take his point of view from the present moment, with the overflowing cornucopia of inventions in full view, and not for a moment doubting, or affecting not to doubt, that the tide of invention will flow as freely through the desert and irrigate the barren sands he presents to their view as at present, in a more fertile country, and under brighter auspices. He hardly calls his *terra incognita* an El Dorado; but he has at least, at page 88, held up a sugar-plum of 125,000*l*., to be divided among 750 poor, and, probably, very hungry inventors. Let Mr. Macfie but read the Transactions of the Society of Arts for the last 75 years, and he would soon learn the character of the improvements he would encourage. What Mr. Macfie particulary urges is—deliverance from the bondage and wrongs involved in Patent monopolies (page 11). At page 20 he gives an extract which shows that, according to an Act of Edward VI., the "saving of labour was in those early days an inconvenience." And Mr. Farey having observed—"If this decision had been followed, it would have set aside every patent for invention." Mr. Macfie adds—"True, and the more's the pity, perhaps. Let us hail the admission." This is so thoroughly characteristic of the manufacturer, that Mr. Macfie should, as a prudent counsel, have kept it in the back ground; but it is far from being a solitary instance of his haste and indiscretion in bolstering up a weak cause. He notices, and very properly, that according to the statute "patents are illegal which raise prices or hurt trade," also that the intention "was to allow no monopoly to exist whose effect would be either to interfere with the extent or efficiency of industrial occupations, or to make prices, even of the new manufacture or commodity, dearer under the restriction than they would be without it." These limitations he boldly asserts (only asserts) "have been utterly neglected, and the nation suffers much from the neglect." Nothing, however, comes of this grand protest. We are only reminded, as it were, of those tragic scenes which are enacted beyond the ken of spectators, and taken for granted to have occurred, but as too terrible and awful for personal exhibition. It is exactly thus that Mr. Macfie works up and ends this drama. Mr. Macfie is very parental and patronising in respect to patentees; he has a comical sort of pity for them; under his care they appear to be a peculiarly weak, silly, simple sort of people, and when they become patentees they lose all his respect; and he is careful to assure them that patents have so declined in England and France that "to be a patentee is by no means usually reckoned an honourable distinction" (page 83). He reminds them that patents are "a lottery" (page 24). He makes a strong point of simultaneous invention, and warns his pupils "that there is a natural tendency to the making of the same inventions, and of inventions directed to the same end, or moving in the same line, by a number of persons at or about the same time." It will be thus observed that he is an uncompromising advocate for the subversion of competition among inventors as well as manufacturers. He would have the two, three, or more inventors all equally rewarded, and not for one to get the head of another, as in a race, although no such race might be contemplated. He knows this will not be of any actual benefit to inventors, but it is his interest to have their advocacy in favour of the abolition of a law which in some such solitary extreme cases has not proved beneficial in rewarding several instead of a single inventor. And he quotes, with considerable gusto, the remark of the Lord Chancellor on such a case that it was "the loss for a year or more to the public of the fruits of the ingenuity of many minds which commonly are working together in regard to the same invention." He quotes, with approval, from the *Journal of Jurisprudence*, the remark that—"In an age of mechanical invention an inventor cannot deprive the world of a new process by keeping it a secret. He can, at most, only retard the progress of discovery by a few years," or suppose we add a few centuries. Why, it is progress we want, and retardation we dread. Should Mr. Macfie survive to see the Abolition of Patents, and be waited on, for example, by a chemist who had realised a process for the manufacture of sugar from sawdust, at half the cost of any sugar imported, he would say to him, work your process in *secret;* or, if capital were wanted, he would ask for security, because any servant might get at the secret. But there might still be open to the chemist the possibility of patenting his invention in America and elsewhere; and sooner or latter the British manufacturer would procure specifications detailing the whole process, free of any recompense to the original inventor, and with as little care or respect for his memory as it is possible to conceive—a view of the matter which may strictly accord with certain political notions of free trade in all things, whether material or mental; but certainly neither very dignified, complimentary, or encouraging to the British community.

Those who argue in favour of patent law abolition never give to their statements any statistical support. For example, Mr. Macfie will be aware that the sugar trade has been successively on the increase, the importations having risen from 8,000,0000 to 12,000,000 tons; but how would he show from such a statement that patents have hampered that branch of commerce? He asks—"Do patents, on the whole, promote our national welfare?" We answer, decidedly, not one department having fallen off, or at present being in a state of premature decay. With facts before him, why does he always prefer substituting metaphysical disquisitions about our ideas, theories on free trade in inventions, and the hypothetical views of foreigners, whose laws, constitution, and individual tone of thought differ widely from our own? The result is that the future of invention is examined and calculated on from our present point of view. To argue in respect to inventions dating from our present wealth in patent property, is the argument of the spendthrift, who believes in the inexhaustible nature of his worldly possessions. We have enough and to spare of inventions, say the abolitionists, and a famine is impossible. Do inventions flourish in China, Japan, or even Holland or Switzerland? Do they reap all the promised advantages of freedom from the bonds of patent laws? If not, what are the facts on which abolitionists base their theories? Is the liquifaction of carbon and the production of a glass of diamond-like quality, among inventions of the future, to be given gratis by the inventor to a new class of crystal manufacturers; or is he to trust to their tender mercies to pay him 500*l*. or 1000*l*., after much disputation and examination of his wonderful invention? Is the future inventor of some water-fuel scheme, doing away with the necessity of burning coal, to be treated with equal leniency, benevolence, and consideration? Is the future inventor of the first practical electric engine, superseding the steam-engine, to be raised to the pinnacle of fortune with Mr. Macfie's largest gratuity of 10,000*l*., provided always he can establish his claim through a series of obnoxious proceedings? Is the future navigator of balloons to be rewarded after a like fashon? Are chemists and engineers expected to be less men of ambitious expectation than heretofore; and senseless enough to spend fortunes at all hazards without patent protection? The patent abolitionist is "the charlatan's best friend," as stated in Mr. Dircks's "Inventors and Inventions." They favour secrecy and deception of the worst and most dangerous character. The wild practices of charlatans would become again as rife as in the darkest days of alchemy and astrology. But worse even than this is Mr. Macfie's effort to abridge, if not to stifle, competition; to render it impossible for sheer ingenuity to compete against capital, except indeed in special cases of secrecy.

Now, what is the actual working of the patent laws? The produce of a large crop of inventions and improvements on inventions. Like the corn field, they are not corn without tares; they are, like the body politic, good and evil together in the same family; and yet we do not think of exterminating either, because they are not so perfect and complete as we could wish. The Patent Records are an invaluable store-house of the productions of the inventive genius of this country for four centuries; and only for such records we should have had to depend on tradition for many early productions of genius. The number of such recorded facts may appear to superficial observers, and men of purely legal, political, or commercial pursuits, to be dry, uninteresting, and rather confounding and oppressive than useful. But they are, nevertheless, the products of much mental activity, and are not to be despised merely because they have not all the charms of the lightest literature of this sensational age.

Mr. Macfie calls his present literary labour a "bulky compilation;" bulky it is sure enough, but such a heap of ill digested, miscellaneous, and unarranged matter is certainly not a "compilation," any more than a confused heap of building materials could be designated a building of any kind whatever.

ABOLITION OF PATENT MONOPOLIES.

SIR,—Believing that patents are a restraint and burden, injurious to all productive operations, mining as well as manufacturing and agricultural, I feel disappointed that the advocates of abolition have not had the great advantage of your support; but that, on the contrary, you have forged and discharged in your widely-read columns, double-shotted, your strongest artillery in behalf of the adverse cause. I refer you to the accompanying, as affording a suggestive instance in support of abolition. Other patents in connection with metals—such as Neilson's and Henderson's—would be similarly instructive.

Oakley-terrace, Denniston, Sept. 14. R. A. MACFIE.

TO THE EDITOR OF THE LIVERPOOL ALBION.

SIR,—You have transferred to your columns, and so given currency to a question put to me by the Editor of the *Engineer* in his last number. "Does Mr. Macfie," he asks—after telling the reader that Mr. Bessemer enjoyed "enormous royalties for a series of years,"—"believe that the steelmasters of Great Britain paid Mr. Bessemer a single farthing more for his invention than it was worth?" My readiest reply is: Look at the Mersey Steel and Iron Company's (Limited) procedure in shutting up the steel department of their works (with published approval of trade periodicals) until these royalties cease to be due. Surely this is evidence that the royalties exacted are in that company's experience or belief higher than the use of the invention is worth. But a more important consideration remains behind, one generally by inventors' so-called friends left out of sight,—the effect on British and Irish national interests. What a patent brings in to its possessor and his licences is one thing; what its effects on commerce and manufactures another and very different thing. To illustrate: I ask if the loss of orders to the extent of 5100 tons of steel rails, mentioned in the last *Ironmonger*, is not attributable to these royalties? That periodical, which ought to know the facts, say that "English railmakers formerly supplied the great part of the steel rails required for the United States railways," and that this country has lately lost, likewise, sales of considerable quantities to other companies.—*Ashfield Hall, Sept.* 9. R. A. MACFIE.

PATENTS OR NO PATENTS—No. I.

MR. MACFIE'S ARGUMENTS DISPROVED.

SIR,—Our present Patent Laws must now be considered as under a process of impeachment, prosecuted chiefly by Mr. Macfie, therefore, notwithstanding the able refutation of that gentleman's notions, contained in your review of his recently-published work, I would yet ask leave to place before the public a few additional arguments in favour of patents, which may be worthy of some consideration; but before stating these arguments, it may be well to remark that, although Mr. Macfie is the prominent promoter of the charges against these laws, he is not their only assailant, for without reckoning Sir R. Palmer and Lord Stanley, who row in the same boat with him, there are many inventors (especially that large portion which belongs to the working classes) who complain of the practical operation of these laws in their present form; hence it may be fairly considered that they are objected to on all sides, on the grounds of policy of principle and of practice.

All your readers will, I think, be aware that I am no friend to the Patent Laws of this country, as now constituted, consequently they will not expect me to defend what may be objectionable or defective in them; at the same time, it will occasion no surprise to find in me a defender of the sound policy and right principle of laws for securing, as far as human laws are capable of doing so, to inventors and *promoters* of new and useful inventions remuneration for their labours, in proportion to the public utility of them; and that I hold that no other systems than Patent Right or Copyright in designs have hitherto been found practicable. And whether we attempt to deal with the fundamental opposition of Mr. Macfie and his friends on the one side, or the objections of complaining inventors on the other side, we shall, I think, soon arrive at the conclusion that both sides are influenced by grave fallacies and misconceptions.

Mr. Macfie begins by objecting to our inventions—patent system, because it originated in the power of conferring Royal favours by means of special grants and charters, and so the patent system grew up alongside that pernicious system of real monopolies which it was the professed object of the well-known statute of monopolies of James I. to uproot. On the same grounds, he ought to account the fruits of the earth as unworthy, since the weeds will persist in growing up along with them; and certainly, if such an objection as this is to prevail, it is one that will apply with tenfold greater force to a vast number of the landed property rights in the kingdom, for they originated in Crown grants of mere grace and favour, of which property possessed by the Dukes of Norfolk and Bedford, and by other noblemen and gentlemen, are notorious instances.

His next objection is that (if there be any such things as inventions in the usual acceptation of the term, for he professes great doubt on this point) though somewhat inclined to rank them as cryptogams, of which the practical development is a matter of fact, whilst their origin is a mysterious puzzle. Yet inventions are not fit subject matter for property, because they are ideas, and substantially "may be held in common, which is not the same with things material." (See page 9 of his last work.) That is to say, no man ought to be entitled to any exclusive right to profits from an invention, because, although priority of possession of the idea might be with him, the idea is capable of entering into the mind of some other person at some indefinite period.

This argument, if worth anything, would be utterly destructive of a host of copyrights which Mr. Macfie says he "advocates," because substantially the same book might be written on almost any matter for compilation, translation, or abridgment; and it would go far to destroy large classes of proprietary rights now upheld by law, such as riparian and piscatorial rights, and so forth. Indeed, to give it full effect would be to stultify the old prudential truism that "a bird in the hand is worth two in the bush;" or, more strongly put, it is an averment that the bare possibility of getting a thing to-morrow is quite as good as really having it to-day. A line of argument that must at once be reprobated by commercial men, who know that to meet the present close pressing system of competition the loss of a day may be the total loss of the market. It is also a species of argument subversive of the well-recognised theory of the origin of many exclusive proprietary rights—first occupation. In point of fact, this argument may be a reason why patent rights and copyrights should not be perpetual, but temporary and limited, and is valueless as prohibiting the existence of those rights when tempo-

rary and limited. Mr. Macfie further objects that, as a matter of fact, patents prevent manufacturers from adopting various improvements in their manufactories which they would adopt if not hindered by the prohibition of patentees.

This either means that manufacturers will have nothing to do with improvements when they have to pay the inventor or promoter of them. Or that when they do attempt to make payments to the inventor or promoter his demands are so extortionate that manufacturers cannot afford to carry on business subject to such payments. Neither the first nor second of these meanings can be sustained by actual facts, for it is well known that numerous manufacturers are paying royalties to Mr. Bessemer, Mr. Siemens, and to many other patentees. And the second of these meanings applies merely to some out-of-the-way cases occasionally occurring, the recurrence of which might be prevented if desirable by licenses being by law always obtainable on reasonable terms, assessable in case of dispute by arbitrators, which would also meet cases of the total withholding of licenses by a patentee, which is another objection raised by Mr. Macfie.—*Temple, Sept.* 15. F. W. CAMPIN.

PROSPECTS OF COPPER MINING.

SIR,—The remarks of "Metamorphose," in the Journal of Sept. 4, are geologically and practically sound, and worthy of consideration. In the first place, the geology of Dolcoath, Cook's Kitchen, Tincroft, East Pool, and Carn Brea Mines are precisely similar to that of the Godolphin, and the Crenver and Abraham, in Crowan, both situate at the base of granite hills, similar to those of Carn Breage hills, near the Vor Mines; but the old Fortune Mine is at the least a mile from the granite formation, though the lode at the productive part is traversed by a large elvan course, or porphyry channel, which may have the same effect in depth on the bearing measures, as nearer the granite, and be found productive of tin at greater depths, instead of copper. Near the surface, immediately under such a mass of gossan, porphyry or elvan traverses this enormously productive lode for several miles in length obliquely, and where the intersection takes place a large deposit of copper was invariably the result. At the extreme end of this enormously productive lode, near the granite, very rich grey and bell-metal copper ore was found, and which at a greater depth yielded peacock, horseflesh, and purple copper ore—in fact, representing all the colours of the rainbow; but the five great mines in the centre of these two great deposits yielded large quantities of the yellow sulphuret copper ore, to the depth of about 200 yards from the surface, when the copper appeared to decline, but leaders or branches of tin existed, and were then to be found. At that period tin was selling at below 30*l.* per ton, and considered of but little value; consequently this mineral was neglected, except when found in large deposits.

When we carefully examine the conditions of our imports, whether of tin or copper, it must become evident that the mineral proprietors of Cornwall and Devon have in the future a race to run with foreign and colonial adventurers in those mineral fields which are now being largely developed by the capital and industry of British enterprise. All import duties have ceased to exist from Jan. 1 last, so that the heavy royalties or dues demanded in this country will operate seriously against the working of our deep mines, and recent examples fully testify to the truth of these remarks.

Mr. Hyde Clarke, in his letter of the 4th inst., mentions the introduction of copper sashes, by Messrs. Turner and Co., of Manchester, instead of iron or wood, and the superiority of their appearance. The cost would be but a trifle more, in the first place, the strength would be greater, the article worth more than old iron or wood in case of being sold, and the durability much greater there can be no question. Also copper boilers, instead of iron, equally applies economically. The accidents to life would not be one out or a hundred instance if copper boilers were used, besides the vast destruction of property when an explosion occurs in a crowded part of a city or town. Old iron boilers become valueless in a few years, but copper would always fetch two-thirds its cost; a much higher pressure would be obtained, and much less fuel consumed, so that it is only a trifling more outlay in the first instance. Had copper sashes been intrduced into that splendid row of buildings on the new embankment of the Thames, opposite the Houses of Parliament, instead of wood, which I am informed were all made in Belgium, what an impetus it would have given to the trade of this country, and have opened up a new channel of commerce. —— A. BENNETT.

INVESTMENTS IN MINES.

SIR,—In this country for the past few years mining, comparatively speaking, has been neglected. It has been less attractive than other enterprises; to all appearance often the least attractive of all enterprises. There has been about it the slowness and dulness of plodding hard work; none of the brilliancy of taking over the business of manufacturing concerns, or of concocting hotel and other projects. As a consequence, recent mining adventure is, without one of the disasters or any of the odium that almost has attended everything—trade bankruptcies, voluntary and compulsory liquidations, and contentions for the substantial gains inseparable from the position of official liquidators. Left to itself, mining has kept to itself; and if, relatively, for the past few years the great rewards have been few in number, so also the losses have been smaller than perhaps the oldest miner can remember. Now the time has come when mining investments should be put before the public; when, in truth, the public should be made to think that if a fraction of the speculate, high-pressure activity of the past few years had been bestowed on Devon, Cornish, and Welsh mines the general condition of the kingdom today would be even more hopeful than it is. In mining, plodding hard work, when well directed, seldom, if ever, fails to yield rewards as profitable as they are bountiful.

From time to time, when the price of tin had touched the lowest point, I endeavoured to infuse in the readers of the *Mining Journal* some of the spirit of enthusiasm that the sure prospect of early gain is supposed to excite. I further enlarged on the wisdom of choosing such mining ground only as possessed the changes in rock formation, metalliferous veins, and cross veins that are associated with and inseparable from the larger formations of metallic ores; and likewise on the common sense of selecting mining shares only in those companies that in a miner-like manner do their work—in other words, that know what they are about, by giving practical effect to the mining secret of economy and energy combined. As regards the first of these efforts, the advance in tin (almost equal to doubling the price) fully attests the accuracy of the arguments adduced. Tin was too low. Generally the market price left no margin to the producer. Moreover, a market price lower than what returns a fair profit to the producer will always bear this one construction, that the demand is small, and that with the least revival in industry prices will instantly advance. The readers of the *Mining Journal* will readily recall what I said, and now the change has come. Within the past few weeks the rebound has come that has restored to high-water mark numerous bank balances. It has, besides, improved all tin-producing properties—some of them 100 per cent., some of them as much as 200 per cent.

The return of prosperity to the mining market has virtually led to a considerable influx of new capital; this new capital, generally well placed, refused as usual to enter a lifeless market, and, indeed, stood aloof so long that it may well be doubted whether without a new trade-spurt in tin it will be perfectly satisfied with its investment. Generally, it has come in on the top wave, once more illustrating this, with other points, that the capitalist will not invest in mining property at a low price, however much and well the property may be recommended; and that, as regards the public, not until a large premium is demanded, or until shares touch a high market price, will they purchase. This I do not say as a reproach to the capitalist or the public, for the shareholders of mines are as peculiar in their way as the public and the capitalist. For when a mine is prosperous, and the shares in the market command a high price, shareholders, as a rule, will be found exerting themselves to increase the market value of their property; but should anything unforeseen and unprovided for arise—such as a great fall in the price of metals—the same men, as a rule, will be found rushing from their property, with the same disregard of consequences as the proprietor of a house that happens to be on fire. They will not hold on and persevere, but sell out they will at any sacrifice. Were it possible to trace back to its source any particular loss in mining property it probably would be found to have had its origin in this sort of panic. Cornwall, Devonshire, Wales, and other districts might, at least, cite instances without number where splendid mining properties have been madly suffered to pass to ruin, Indeed, many a Welsh mine now selling at high premiums has been previously worked and abandoned for want of the nominal outlay which has since been spent to bring it to its present value. In Cornwall, too, many mines have recently been abandoned because of the low price of tin, and the shares of others have been so worthless that they were to be bought for less than the price of the transfer stamp. But, as before remarked, a change has come; and, doubtless, before long increased activity will be experienced. To those who through good and evil report have maintained unswerving faith in mining property it is a good reflection that, while for seven years or so mining property has received little or no countenance from the public, the loss for the period in all the mining operations in Cornwall, Devonshire, and Wales is short of the amount sacrificed by one considerable monetary company that has been started, worked, and wound-up in the time.

But I fear I am trespassing unduly on your space. What, therefore, I proposed to add on the subject of the harvest and other matters of a cheering tendency I must postpone. Of these latter, however, it may be well to direct attention to two recent publications—"How to Invest, and What to Select," by E. J. Bartlett, and "Lead Mines as an Investment," by J. H. Murchison, F.R.G.S. Both of these publications corroborate some of the opinions that from time to time I have advanced. Mr. Murchison observes—

"It is very unsafe to be guided as to the value or merits of a mine by what is called the quotation of the price of its shares. Some of the most promising and most profitable of the lead mines are not known at all in the market."

Mr. Bartlett observes—

"There can be little doubt that by a judicious selection of mine shares the investor will receive a fair and handsome return. Doubtless, great prizes have been found in untried ground; but, as a rule, success is more often obtained in well-known districts."

One quotation more: this time from page 6 of my own "Mining Fields of the West"—

"The prices of copper and tin have been in former times depressed to a lower point than at present, owing to temporary causes, and many persons then took the gloomiest possible view of the matter, and thought they should never see a re-action;"—*but it came.*

3, *Great St. Helens, E.C., Sept.* 14. CHARLES THOMAS.

FACTS OF THE SAND AND GRAVEL FORMATIONS OF THE SOUTH OF THE ISLE OF WIGHT BASIN.

SIR,—In my letter, which appeared in the Supplement to the Journal of Sept. 4, I stated that the sand pits at Mopley were to the north-west of Fawley, whereas they are to the south-west; and as since that letter was in print a fact has presented itself that completely revolutionises the last paragraph relating to the gravel, a few more observations become necessary on this highly interesting question—the key to all the other formations of the Earth's crust.

The application of the magnifier to the sand of gravel has always conveyed to my mind the impression of its being of original formation, and not detritus, but that impression prejudice overruled. On an inspection, however, of any large flint of gravel of this locality, it will be seen that it is not one homogeneous mass, but is composed of a number of lumps, and which lumps are compounded of smaller flints, in every respect identical to those by which the large flints are surrounded in the beds; and in a hole of a large flint now before me there are some grains of very coarse sand, or very small pebbles, firmly fixed by cohesion; so that, unless facts mislead, in gravel there is not a particle of detritus; and unquestionably the sand, small flints, and large ones, composing the gravel, had thoroughly hardened or crystallised, before reaching its present position.

In my previous letter I have drawn attention to the fact that the sand of two sand pits, within 200 yards of each other, is totally different in character; and if any of your readers should take an interest in the matter, and will pay a visit to this locality, they will find, I think, that some such difference is traceable in the gravel.

While residing at Millbrook, near Southampton, I collected a number of large flints, in every respect identical in shape to the flints in chalk, having on their surfaces protuberances, *apparently* the base of branches, and as in the "debris" I found pieces, or small flints, that appeared to have been branches, I came to the conclusion that they and the large flints once were one; it not having occurred to me at the time that all such branches were wanting on the flints in chalk, where they certainly would have been preserved, since, in the absence of weight, objects the most delicate in structure there retain their form. Those flints are compact, or homogeneous, whilst their "cleavage," to form gun-flints, implies a compounding. At Eaglehurst those flints are wanting.

As I have already stated, the gravel at Eaglehurst is in layers, although not so regularly superposed as the sand on the top of which it rests, and in the gravel there are layers, not only of very coarse sand, but also of sand as fine as the coarse sand from which I extracted the small flints and bits of chalk, above the *base line*, both which facts afford unquestionable evidence of a gradual passage from one system of formation to the other; and, after a most minute search, I have been unable to find even the trace of a shell, not a particle of one, either in the sand or gravel; but I am informed by brickmakers that very low down in the sand they have occasionally, but very seldom, found "bits of shell," but whether those bits were fragments or small shells I am unable to declare, although "there are plenty of them in the clay." I have, however, two flints with impressions of shells on them.

Going downwards we have facts no less instructive. The Wealden

"Is not entirely destitute of marine fossils, and it has, therefore, rather the character of an estuary than of an inland lake. In England, the base of the formation is the well-known Purbeck limestone, distinguished by a profusion of fresh water shells. The beds of limestone are separated by marls, and the conjoint thickness is about 250 feet, *which is an immense depth for a fresh water deposit.* The Hastings sands, with clays and calcareous grits succeed, and are about 400 feet thick, *being equally extraordinary as a fresh water drift;* and the whole is covered by the Weald clay and its thin beds of sand and shaley limestone, about 200 feet thick."

The facts mentioned clearly show that until the intrusion of the fresh water ocean to the north of the belt, the fresh water deposits in ponds on the belt, into which no salt had intruded, were comparatively small; and then it is said "it is evident, therefore, that a *very large portion of Europe* was once covered with fresh water," but which fresh water did not extend very far south. The oolite or jura formation, it is said, is a limestone composed of an aggregation of small round grains or spherules, and so called from its fancied resemblance to a cluster of eggs, or the roe of a fish, the principle collecting and combining which aggregation is repeated in the formation of the flint of gravel; and in the jura there are the roe-stone and the celebrated lithographic stone of Solenhofer, the latter of which is extraordinarily pure and dense, and from the thinness and *regularity of its layers*, peculiarly fitted for lithography, all which facts bespeak a perfect stillness during the formations, the same condition being traceable through all the other formations down to the slate, the splitting nature of which need not be described.

In Wiltshire there are equally well defined layers of sandstone, and some of these, or others of a like nature, were removed in gigantic masses from their beds, transported to a considerable distance, and raised on their ends for the reception of enormous masses of stone as roof, constituting what is known as Stonehenge. The period of this erection is not known, and we are likewise at a loss to conceive its purpose, but be that purpose what if may, it bespeaks a barbarous age, when probably man lived on the spontaneous fruits of the earth, and he must have been a stranger to mechanical appliances, a remark that equally applies to the Pyramids. How, then, were these structures put up? To repeat what I have so often said, apparently to no purpose, *all incandescent bodies are surrounded by an atmosphere electrical in proportion to their incandescence.* and *weight is nothing more than the indication of the force by which a ponderable body is repelled by the surrounding regions, or electrical space*, and the Earth is approaching the Sun, a highly incandescent body. The gravel, then, which has now a density sufficient to cause it to sink, when the orbit was less electrical, *floated* to its present resting place, and the huge flat boulders referred to in my previous letter floated also at a much later period, and evidently as density or weight, could have increased only when the orbit became sufficiently electrical to repel matter to the Earth's surface, the stones that now weigh tons may at the time of their erection have weighed only so many cwts, or lbs. There stand the facts, and matter increases in weight both by compression and contraction, as I deduced in 1848. This period has yet to be determined, but which, as well as that of the creation of man, could no doubt readily be discovered, were there a spark of honesty of purpose in the scientific world, who, notwithstanding the papers by "S.," that appeared in the Journal of 1849, on my discoveries in natural philosophy, my papers of 1851, and those of 1868, on "The Solar System Geologically Considered," persist in poisoning society with such "doctrines of the schools" as those in No. I. on the "Chemistry of the Mine," at Wolverhampton, by Dr. Hill, M.D., F.C.S., of Birmingham, &c., a review of which appeared in the Journal of the 4th inst.; although Mr. Charles Moore, F.G.S., M.B.A., on the question of Mineral Veins, having so far progressed as to have arrived at *electrical conditions*, there are grounds for hope.—*Fawley, Sept.* 13. FRANKLIN COXWORTHY,
Author of "Electrical Condition."

P.S.—I inclose for your inspection a sketch showing the general character of the flints at Eaglehurst.

MINERAL WEALTH OF PORTUGAL

SIR,—In my letter which you were good enough to insert in the Supplement of last week's Journal I gave a list of the localities in which lignite appeared in the district of Leiria, together with a brief outline of the nature of each deposit. I now purpose giving a short account of the searches made for coal and their results, and also my reasons for concluding that the coal beds do not belong to the true carboniferous epoch.

CHAO PRETO COAL FIELDS.—Chao Preto (black field) is situated about one mile from the town of Batalha, on the north side of the River Lina, the hills rising somewhat abruptly from the river to a considerable height. Before any actual work was done the prospect of a good supply of coal being found was most encouraging, but it quickly vanished before the very able searches undertaken by Mr. William Lintern, the company's last mine manager. Before he was appointed, however, several bore-holes and trial pits were sunk in different parts of the locality. The diary of one trial, the first ever made, I believe, is as follows:—

	Ft.	in.
1. Surface soil	2	0
2. Coal (good)	1	0
3. Clay	0	8
4. Coal	0	2
5. Clay	0	6
6. Coal	0	4
7. Clay	1	6
8. Coal	0	6
9. Clay	0	2
10. Coal	0	2
11. Clay	0	1
12. Coal	0	2
13. Clay	0	6
14. Coal	0	2
15. Clay	0	1¼
16. Coal	0	6
17. Clay	0	2¼
18. Clay	4	0
19. Coal	0	4
20. Clay	0	4
21. Coal (good)	2	0
22. Clay, mixed with coal	1	4
23. Blue plate	9	0

The coal in this pit dips 22° W. of N., at an angle of 13°. A bore-hole put down in the bed of the stream gave the subjoined section:—

	Ft.	in.
1. Bed of the stream	—	
2. Blue clay	2	0
3. Coal splint	1	4
4. Black shale	3	0
5. Light shale	1	0
6. Sandstone (hard)	2	0
7. Coal, mixed with shale	3	0
8. Black shale	4	3
9. Sandstone (hard)	0	6
10. Fire-clay	2	0
11. Black shale	16	10
12. Sandstone, mixed with coal	0	10
13. Dark shale	8	0
14. Light shale	7	0
15. Fire-clay	0	6
16. Light shale	50	0
17. Strong grey shale	1	5
18. Strong freestone post	1	6
19. Coal	0	3
20. Strong grey shale	0	7
21. Dark shale	1	0
22. Black blais	4	0
23. Light-blue blais	26	0
24. Strong freestone	0	8
25. Light-blue shale	18	0
26. Dark-blue shale	0	10
27. Strong freestone	3	0
28. Dark-blue shale	0	10
29. Strong freestone	0	8
30. Dark-blue shale	2	0
31. Dark shale, mixed with coal	4	0
32. Freestone	1	0
33. Dark-blue shale	2	0
34. Shale, mixed with coal	2	0
35. Black blais	4	0
36. Light blais	9	0
37. Strong grey blais	1	0
38. Dark shale	4	0
39. Blais	3	0
40. Dark shale	10	0
41. Light shale	12	0
42. Dark shale	15	0
43. Ochrey shale	2	0
44. Light shale	1	0
45. Ochrey shale	4	0
46. Red sandstone	5	0
47. Dark shale	13	0
48. Ochrey shale	13	0
49. Whinstone (blue)	2	0
50. Light shale	5	0
51. Red sandstone	3	0
52. Light shale	2	0
53. Red sandstone	17	0
Total depth of bore	297	4

These two trials were made under the direction of the late Mr. J. Fernie, of Newcastle, from whose reports I have taken the above.

The real work of exploration commenced with the appointment of Mr. Lintern, who immediately recognised the nature of the country he had to deal with, and adopted the best method of proving whether coal existed in workable quantities. The principal works executed under his direction were three levels, two on the north and one on the south side of the river. No. 1 heading, driven 25° east of north, and about 25 fathoms in length, passed through four seams of coal 1½, 3½, 20 and 3½ in. thick respectively; they were cut about 8 fms. from the mouth of the level, but soon appeared to be cut off by a throw; at 17 fathoms a short cross-cut was made in the direction of the throw, with the view of again finding the coal, but without success. No. 2 heading, nearly 30 fathoms lower down the hill, was then driven in an easterly direction for 92 fathoms, but no coal was found; at 50 fathoms a band of magnetic iron ore, 18 in. in thickness, was discovered. No. 3 heading, carried 45° west of south, on the southern side of the valley for upwards of 100 fathoms in length at one time promised to be a most remunerative mine, an open cut on the top of the hill having discovered several seams of coal; in the level itself, however, only one seam of coal worth working was met with, this was good, and the coal was used in the smithy while it lasted; it was, however, soon worked out, the seam dwindling away to nothing, and I think I may safely say that all the seams of coal which offered the least prospect of remunerative working were thoroughly explored.

The first searches for coal in this locality were undertaken by the Portugal Iron and Coal Company, under the idea that they were working in the true carboniferous formation. At first sight the bands of coal, alternating with clays, sandstones, shales, and limestones, almost exactly resemble the coal measures, and might lead to the mistake; but when we come to examine the fossils found both above and below, we find them to be such as to fix the position of the series in the upper oolite. The most characteristic genera are *Astarte, Cyprina, Exogyra, Pholadomya, Fusus, Paludina, Belemnites*, and some others.

ESPITE COAL FIELD.—There was some work done here to explore what was reported to be a very promising coal field. I have not seen the place myself, but Mr. Lintern reported in June, 1865, as follows:—

"I spent a week in examining this district and the works which had been carried on in search of coal under my predecessor, but which had been stopped before I arrived in Portugal. I explored the neighbourhood very carefully for some distance around, and from all I was able to learn and observe I do not think the stoppage was ill advised. To my mind it afforded no hopes of the presence of any workable coal in the strata undergoing exploration, and I saw no reason for recommending a resumption of the work. What future discoveries may be made here I cannot pretend to anticipate, but I am not sanguine that workable coal will be found."

I hope next week to give you a *resume* of the searches made for iron ore, and their results. E. HEYDELBACH DAVIS, F.C.S., F.G.S.
West Brompton, Sept. 14.

[For remainder of Original Correspondence, see this day's Journal.]

NAPHTHALINE COLOURS.—For the production of colours from naphthaline Drs. DARMSTADTER and WICHELHAUS, of Berlin, have invented an improved process. About one part by weight of naphthaline is taken, and about one part by weight of concentrated sulphuric acid, and they are heated together at a temperature of about 100° centigrade, until the greater proportion of the naphthaline has been converted into sulpho-naphthalic acid. This product is then to be dissolved in water, and the solution saturated with an alkali. The salts of sulpho-naphthalic acid thus obtained are evaporated to dryness, and are fused with an alkali, such an caustic potash or soda, or with mixtures of the same, so as to obtain compounds of naphthalic alcohol, which upon the addition of dilute acid to the aqueous solution the naphthylic alcohol or naphthol is precipitated, and may be obtained in a crystalline form. The before-mentioned naphthylic alcohol or naphthol so prepared or obtained from any other source is to be dissolved in about an equal weight of strong sulphuric acid, and the solution is then gradually added to nitric acid, by preference previously diluted with water, the temperature of which mixture has been previously slightly elevated. The solution passes through different tints but finally assumes a yellow colour, and the yellow colouring matter crystallises out of the solution on cooling. This substance has been called dinitro-naphthylic alcohol or dinitro-naphthol. The colouring matter thus obtained is to be freed from any adhering solution and is then ready for use. Should it be necessary to subject the colouring matter to a process of purification it may be purified by solution in an alkali, ammonia for example, and be precipitated therefrom by means of muriate of ammonia or otherwise. When this colour-

ing matter is to be employed for the purpose of dyeing or printing it may first be dissolved in a solvent, such for example as alcohol, or it may be dissolved in an alkaline solution. The pure substance, or its soluble salts, may either be employed alone or in conjunction with other colouring matters for the purposes of dyeing and printing in a manner as is well understood.

COLORADO: ITS RESOURCES AND PROSPECTS.

Increasing interest in the mineral resources of Colorado having for some time past been displayed by British capitalists, the announcement of the issue of a very handsome quarto volume by Mr. BLACKMORE*, containing a full account of all that is likely to be required by commercial men, will give general satisfaction. Colorado extends about 300 miles from north to south, and 400 miles from east to west, and occupies upwards of 100,000 square miles. It is intersected by two ranges of the Rocky Mountains, and is distant some 2000 miles from New York, and 1200 miles from San Francisco. It appears that until within the last 10 years the entire white population was represented by a few hundred trappers, but the discovery of gold made the district so attractive that there are now some 70,000 white inhabitants, and Colorado now ranks next to California as the largest gold-producing district of the United States. The recent opening of the Union Pacific Railroad has brought Colorado into direct railway communication with all points of the United States, so that New York can be reached in four days, and San Francisco in rather more than two days; one of the first results being the introduction during the past month of 400 Chinese labourers into Central City. It is considered that the natural progress and prosperity of Colorado in the future is now an assured fact, more especially since, in addition to accessibility, agricultural resources, and vast mineral wealth, the upland valleys of Colorado are distinguished by extreme salubrity of climate, which exercises a wonderful restorative and curative effect upon constitutions enfeebled by pulmonary disease.

Mr. Blackmore divides his book into two parts, the first being occupied by a description of Colorado, drawn from the best and most reliable sources, such as the official United States Government report of Colorado, the report of the Denver Board of Trade, and the writings of such recognised authorities as Bayard Taylor, Bliss, Hollister, Whitney, and Bowles, and contains, moreover, ample reference to mines and mining in Colorado, its agricultural resources, and its great capabilities for the raising of all descriptions of stock; whilst the second part is devoted to the description of the "parks" of Colorado—magnificent and fertile upland valleys, lying at an elevation of from 5000 to 6000 feet above the level of the sea, and surrounded by mountains—particular attention being directed to the Sangre de Cristo grant, the introduction of which to the capitalists of Great Britain is the main object of the book. These parks are well watered, and usually heavily timbered on the mountain slopes. The principal and most interesting, are the North, Middle, South, and San Luis, the latter of which contains upwards of 9000 square miles, equals the aggregate area of the three former, and is considered to excel them in climate, fertility, and mineral wealth. It is in the most southern and best part of the park of San Luis that the Trenchara and Costilla estates, forming the Sangre de Cristo grant, are situated. The parks, from their extent and productiveness, are capable of supporting a large population, and offer some of the best fields for emigration in the world. Prof. Hayden, the well-known geologist of the United States, who has spent the last 15 years in exploring Kansas, Dakota, Montana, Idaho, Wyoming, and Colorado, in speaking of the southern part of the park of San Luis, says—"Its fertile soil, its extensive pasturage, its abundant water-power, its inexhaustible mineral resources, and the salubrity of its climate, all combine to render it the most inviting and most promising district west of the Missouri River, and I can confirm that I known of no region of the West more desirable for settlement than this just described, combining as it does all the elements of wealth and productiveness."

The value of the volume is much enhanced by the beautifully executed maps and plans by which it is accompanied, and from the very readable style in which it is written it is not likely that it will be laid aside until it has been read through. It affords a ready means of ascertaining with the least possible trouble the commercial prospects of the district referred to, and should, therefore, be attentively read by all intending investors in the mines of Colorado.

* "Colorado: Its Resources, Parks, and Prospects, as a New Field for Emigration, with an account of the Trenchara and Costilla Estates, in the San Luis Park." By WILLIAM BLACKMORE. London: Sampson Low, Son, and Marston.

GOLD MINING IN NEW ZEALAND.—A highly interesting report on the Thames Gold Fields, in the province of Auckland, by Capt. F. W. HUTTON, F.G.S., has just been issued from the Government Printing Office at Wellington. It appears that the quality of the gold varies considerably, but averages about 15 carats fine. The yield of gold in the 17 months from the date of proclamation to the end of 1868 exceeded 83,000 ozs., valued at more than 200,000*l.*, and the population numbers about 18,000 souls. The question of the permanency of the mines is one of the greatest importance to the colony. The height of the mines above the sea level varies from a few feet to about 1800 feet, and the present sea level is more than 100 ft. above what it has been in, geologically, quite recent times. The base of the tufa formation is of varying height, as it rests upon the old denuded surface of the slates, but at Shortland it is probably at some little distance below the sea level. Many of the lodes are of the most permanent character, and in those claims where only small irregular veins occur they are so numerous that when one is lost another is sure to be found, and so, in Capt. Hutton's opinion, there is every probability of all the mines extending to the base of the tufa formation. Whether they will or not pass into the underlying slates remains to be proved, but in one case at least (the Tapu Gold Mining Company's reef) such is the case, and it is, therefore, probable that the other large reefs and lodes will do the same; but not, perhaps, the smaller branching veins, which are the effect only of the contraction of the tufa. The comparatively few auriferous lodes found as yet in the slates, in comparison with the number found in the tufa, is no argument against their penetrating both formations, for the exposed surface of the tufa is so much larger, and has been so much better explored than that of the slates, that the result could not well have been otherwise. Capt. Hutton's report is accompanied by maps and plans of the district, which greatly enhance its value.

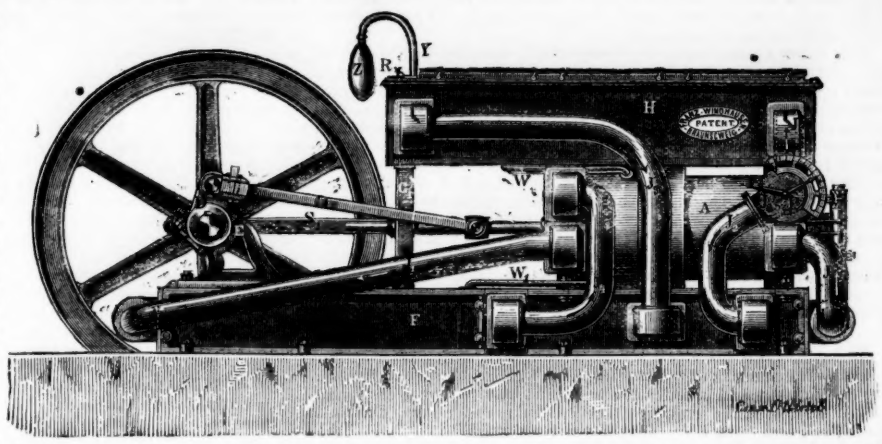
THE CAPITALISTS' GUIDE.—With regard to the statement that "there is at all times great difficulty in determining 'How to Invest, and What to Select,' and in obtaining correct information to guide the capitalist," there are probably few who will not agree with Mr. BARTLETT, and it is to remove this difficulty that his useful little pamphlet* has been written. He observes that by a judicious selection of mine shares the investor will receive a fair and handsome return, and that it is only by following a certain system that a proper selection can be made. It would be well, therefore, in order to judge of the character and reputation of the property, to ascertain before capital is advanced—the locality, the management, the position in a financial point of view, and the price of the stock as recommended. He considers that the adventurer engaged in mining should resort to proved districts in preference to localities comparatively unknown. Doubtless, great prizes have been found in untried ground; but, as a rule, success is more often obtained in well-known districts. There cannot be too strict a scrutiny made of the management of mines. Of late years a reform has taken place; still much caution is required, and a knowledge of the persons in command absolutely necessary. Before embarking in an adventure, the financial position of the concern cannot be too thoroughly ascertained and understood; a knowledge of this will be acquired by the prosecution of enquiries. With regard to the price of shares, it must be considered from two distinct points of view—the market price, and the intrinsic worth; the former varies daily, and does not often represent the real value (operators and speculators moving and altering it to suit their own purposes); while in respect to the latter, investors will, he thinks, be in a position to judge if they adopt the course he suggests. He regards speculative non-dividend shares as affording greater range for profits than many of the old-established companies, and a judicious selection cannot fail to secure large profits upon ruling prices of shares. He observes that more than any other branch of enterprise this description of speculation has been subject to periodical fluctuations of success and depression. In some periods, extending over several years, a larger proportion than usual of rich mines were met with, and those who adventured in them acquired fortunes. It would occupy too much space to enumerate instances, showing that the most productive mines have been discovered by shallow explorations, and from these discoveries followed the periods of greatest prosperity. The pamphlet is well calculated to achieve the object it was written for, and will, doubtless, be extensively read.

* "The Capitalists' Guide." By E. J. BARTLETT. London: The Author, 30, Great St. Helen's, London.

"THE MINING ATLAS."—The description of the mines of Cardiganshire, commenced in the second part of Mr. SPARGO'S "Atlas,"* is continued in the part just issued. He first refers to the Llanfair Mines, which have been suspended for about nine years; they yielded 75,000*l.* worth of lead, and 900,000 ounces of silver, each ton of lead containing 86 ozs. of silver. He states that there is a rich lode in the 90 fm. level, and that a moderate outlay of capital could not fail to return a large percentage. Similar particulars are given with regard to Rhys-Gog, Bron-Mwyn, Bryn-Crach, Cwm Mawr, Bronberllan, South Lisburne, Esgair Mwyn, Esgair Ddu, Glogfach, Glogfawr, Level Fawr, Frongoch, Pontrhydry-Groes, Cwmystwith, and other mines. Referring to the Gothic Mine, he states that it is situated on the south side of the River Rheidol, one mile west of the Rheidol United Mines. It was first worked about 50 years ago by the late Mr. Jones, of Tyllwydd, who commenced an adit level to go under ore that was seen at surface, on what is termed the south lode. In carrying out this work, before the south lode was reached the adit intersected a branch to the north of their intended trial, and good lead was found in it. On opening up this a good lode, 30 fms. long and 16 fms. deep, produced large returns, realising handsome profits, and was worked as deep under the adit as could be without the aid of machinery, the lode continuing its productiveness. The adit under the south lode was continued, but, the ore not being found in sufficient quantities to pay, the workings on this lode were abandoned. The entire description of the Cardiganshire mines are not finished, even in the present part, yet, in addition to those mentioned, the Bodewl, Tygwyn, Dolwen, Nant-y-Cria, the Llwynteify, Issa and Ucha, Bwlchgwyn, Estymtean, Bwdrain, Tyllwydd, the Plynlimmons, &c., are referred to, so that there is an abundance of very useful reading.

* "The Mining Atlas." By THOMAS SPARGO, M.E. London: the Author, Gresham House, Old Broad-street.

NEW MODE OF VENTILATING MINES.



An entirely novel system of ventilating mines has been proposed by Mr. F. Windhausen, of Brunswick, and Messrs. Forbes, Born, and Co., of South-place, Finsbury, are now introducing it into this country. They consider it would be of incalculable value for mines, and especially for coal mines. The object of the machine is to produce any degree of cold, without the use of any mechanical agents, and to supply a means of cooling and ventilating, in all climates, any space, however large. The means by which the machine operates is the application of the physical law—that heat is produced by the compression, and cold by the expansion of atmospheric air, both these results being brought about by mere mechanical power. The distinguishing features of the machine are its comparative simplicity of structure, and the results of its operation without the application of any chemical agents whatever. The degrees of cold produced are so great that they can no longer be measured by mercurial thermometers, since the mercury itself is congealed by its action. It is considered that a mine having been cooled by the machine to a low degree of temperature—say, to 10° or 20° below Zero, Fahrenheit—this low temperature may be maintained by a slight addition of cold—that is, by a gentle action of the machine, so that any inconvenience which might arise from the increase of temperature in depth can be readily avoided.

To those who entertain the fear that the continued prosecution of our collieries will be impeded by the increased heat due to the internal temperature of the earth, the knowledge of the existence of such a machine as that of which the engraving is annexed must be particularly gratifying, since there will be no difficulty in securing a temperature at least sufficiently low for working in with comfort. It is claimed, moreover, that the apparatus may be applied under almost all circumstances. It can either be worked by hand very close to the entrance of the mine, or by steam at a distance. In both instances it will only be necessary to convey India-rubber pipes, hose, or other pipes into the various shafts of the mine. As soon as the machine is set to work the cold atmosphere coming from the machine, being heavier than the air in the mine, will force the impure air and all other gases out, thereby purifying the mine, and making it wholesome and habitable, at the same time preventing explosions. This is all that Messrs. Forbes, Born, and Co., being uninitiated in chemistry and mechanics, can at present state in reference to mines; but as soon as the invention has been practically tested in a colliery ample particulars of the results obtained will be published.

FOREIGN MINING AND METALLURGY.

Activity continues to characterise the Belgian coal trade; the deliveries are numerous, but do not fully respond to the importance of the orders received. The supply of railway plant, and especially of State railway plant, continues insufficient; the deliveries by water, although still very active, are no longer what they should be, in consequence, first, of the insufficiency in the number of boats, and, secondly, of the sharp increase made in freights. Complaints are also made of a want of labour at some shipping places. In the Liége district the extraction, which had slightly fallen off in consequence of a scarcity of labour, has been regaining more importance from day to day. The demand is considerable; deliveries are going on well, but there are some apprehensions as regards the approaching winter, in consequence of the insufficiency of available railway plant. Prices in the Liége district are very firm. The remarks made with regard to the Liége group of workings apply also to the Couchant de Mons, in which district the *materiel* of the State system also makes default.

The shareholders in the Carmaux Mines Company have been convened in an extraordinary meeting at Paris to hear a statement from the Council of Administration as to a recent strike of miners, and the consequences which it may involve in connection with the company's operations. The strike commenced June 26, and did not terminate until Aug. 2. It involved the resignation of the director of the mines, and the establishment of a new tariff. The sudden rise in wages to which the company was obliged to consent, the loss of a whole month's receipts, and considerable damages committed during the strike, and which have had to be repaired, will inevitably involve a reduction in the dividend of this year. A resolution approving the line of conduct pursued by the Council of Administration in connection with the strike was adopted unanimously by the meeting.

The state of affairs in the Belgian metallurgical centres continues favourable; the only drawback is the absence of adequate transport facilities. Prices display great firmness; the blast-furnaces have no stocks, and the rolling-mills are in full activity as regards the production of plates, merchants' iron, and rails. Iron in bars, No. 1, has made 6*l.* 16s.; ditto, No. 2, 7*l.* 8s.; ditto, No. 3, 8*l.*; ditto, No. 4, 8*l.* 16s. per ton. Common plates have made 9*l.* 4s.; and boiler-plates, 10*l.* per ton. Rails have brought 7*l.* 4s. to 7*l.* 12s. per ton, according to the conditions imposed by specifications. It is stated that some important contracts both for casting and refining pig are on the eve of being concluded in the Charleroi group. No new rail contract of any importance has, however, been yet concluded on next year's account. The Providence Forge Company will pay, Oct. 31, a dividend of 4*l.* 16s. per share in respect to the exercise 1868-9.

Considerable activity continues to be noticed with respect to Prussian metallurgical industry. The works have, indeed, more orders on hand than they can well execute. Workmen and tools are wanted, and almost all the metallurgical establishments are increasing their means of production. The Prussian coal trade has just passed through what is usually regarded as its dead season; but, nevertheless, there only exist at the collieries some stocks of gas coal. In order to meet the wants of the autumn and winter, the collieries will have to develope their means of production. At present the price of Prussian coal has not experienced any material change.

Business generally continues to present a satisfactory aspect in the Haute-Marne. The demand does not fall off, but, unfortunately, the orders which reach some works are executed with difficulty, in consequence of the drought which has prevailed. Rolled coke-made iron is supported with great firmness at 8*l.* 4s., and some rather important contracts have been refused at 8*l.* per ton. The price of charcoal-made pig remains stationary at 9*l.* and 9*l.* 4s. per ton. Hammered iron has been very firm at 9*l.* 16s., merchants' bars at 10*l.*, and axles 10*l.* 4s. to 10*l.* 8s. per ton. Machine iron is in considerable demand; 8*l.* 16s. per ton has been currently paid for No. 20. Superior qualities are in demand at present, and purchasers are obliged to accept a quotation of 11*l.* to 11*l.* 4s. per ton for No. 20, ordinary grain; 12*l.* to 12*l.* 4s. per ton for the same number, fine grain; and 13*l.* to 13*l.* 4s. per ton for the same number refined charcoal-made. Some contracts for pig, which we believe we recently stated were in course of negociation, have been definitively concluded. One of these contracts relates to 1000 tons, at 4*l.* 5s. 6d. per ton at the producing works; another relates to charcoal-made pig at 4*l.* 8s. per ton at the producing works; and a third relates to mixed pig, half coke, at 4*l.* 6s. 3d. per ton at the producing works. The foundries are not badly off for orders for pipes and other castings. A second fusion foundry is being installed at the Villeneuve. The works of the Meurthe and Moselle are in an excellent state, orders are abundant, but are not executed so quickly as purchasers could desire, in consequence of the want of labour. Disposeable rough pig, which is quoted at 2*l.* 15s. 4d. to 2*l.* 16s. per ton, makes default, and a forgemaster of the group has been obliged, although a producer, to become a purchaser at another furnace. The price of iron in the Meurthe and the Moselle has not experienced any important modification. A considerable order is on hand for pipes on German account. At Lyons and in the South of France iron has been no less well supported than in the Haute-Marne, and the demand is also active; several forges of the South-East of France not being able, in consequence of the events which have occurred in the basin of the Loire, to reconstitute their stock of combustible, have been obliged to put the North of the empire and Belgium under contribution for coke and coal. At Paris there is a good current of transactions in iron; merchants' iron from coke-made pig does not sell below 8*l.* 16s. per ton in warehouse. An advance of 8s. per ton has just taken place in castings; the rise is even greater in pipes, which are very scarce, several houses having carried the price of pipes to 10*l.* per ton, although at the commencement of August only 9*l.* per ton was currently paid; it is extremely doubtful, however, whether the advance here indicated will be maintained. The Ottoman Government has conceded to the Société des Forges et Chantiers de la Méditerranée the construction of an iron bridge between Galata and Old Constantinople, on the Golden Horn. The length of this bridge is 1950 feet; it will be established on pontoons, and its breadth will be 60 feet: in the middle there will be a tramway. The execution of this considerable work has been undertaken for an aggregate sum of 124,000*l.*

The French copper markets have given way slightly on the advices received from Chili. At Havre the general quotation has been 70*l.* per ton, Paris conditions. At Paris Chilian in ingots has made 74*l.*, and Corocoro mineral (pure copper), 71*l.* 4s. per ton. The German copper markets have been quiet; on some markets—Cologne, for example—there has been a slight improvement. Tin has somewhat improved on the French markets. At Paris Banca, to be delivered at Havre or Paris, has made 142*l.*; Straits, 140*l.*; and English, 126*l.* per ton. The German markets have presented a tone of indecision, awaiting the result of the autumnal public sale in Holland. The quantity of tin which will be offered on Oct. 1 at the public sale will consist of 45,200 ingots of Banca, and 1100 ingots of Billiton; any tin arriving before the 27th inst. may be added to these quantities. The article has just experienced an advance at Rotterdam; thus, 79¾ fls. to 80 fls. has been paid for Banca, while Billiton has brought 78 fls. to 78½ fls.; later advices, however, report somewhat lower rates. Lead has sustained itself well at Havre; 19*l.* has been paid for soft Spanish, first fusion; and 19*l.* 4s. per ton for lead from other sources. At Marseilles lead quotations have been maintained without change. Zinc has been generally somewhat heavy.

FOREIGN MINES.

CHONTALES GOLD AND SILVER.—John Tonkin, July: San Antonio Mine: I beg to hand you my report of work done in the above-named mine during the present month. No. 1 stope, in back of No. 5 level, east of Piper's shaft, has been stoped 39¾ varas; the lode is 3 ft. wide, worth 7 dwts. of gold per ton. No. 1 stope, in back of the deep adit level, has been stoped 37 varas; the lode is 3 ft. wide, worth 3 dwts. of gold per ton. No. 2 stope, in back of the same level, has been stoped 29 varas; the lode is 6 ft. wide, worth 6 dwts. of gold per ton for the first 10 varas. Contrary to former experience, this lode has fallen off in value in rising at this point, and is now reduced to 3 dwts. of gold per ton. The deep adit level has been driven on the course of the lode 11¼ varas; the lode is 6 ft. wide, worth 3 dwts. of gold per ton. No. 5 level has been driven east of Piper's shaft, on the course of the lode, 9 varas; the lode is 3 ft. wide, worth 4 dwts. of gold per ton. No. 5 level, west of Piper's shaft, has been driven on the course of the lode 5 varas; the lode is 2½ ft. wide, worth 3 dwts. of gold per ton. The number of tons of quartz sent to the stamps for the present month is 504, which I estimate at 6 dwts. per ton, equal to about 151 ozs. of gold. In consequence of the disturbed state of affairs, owing to the revolution in the country, together with the heavy rains during the month, the number of tons has been materially less than would otherwise have been the case. The first part of the month we were not able to do much from the want of native miners.—P.S. No. 4 level, at Consuelo, has been driven 4½ varas on the course of the lode, which is small and poor.

Aug. 6.—Since writing the above a body of soldiers have been in and taken all the natives employed in our mines; we are, consequently, now unable to send any quartz to stamps. Although all our men were previously engaged under contract for two months, with the sanction of the authorities, and their separate agreements signed and stamped by the Government officials duly authorised for such business, they have now ignored the legality of the same altogether.

Trinidad Report, July: During this month Trinidad level has been driven 4 varas; lode 3½ ft. wide, yielding a little gold, but not enough to value. No. 1 stope, in back of Trinidad level, west of Robert's rise, has been stoped 7 varas; lode 3½ ft. wide, yielding 3 dwts. of gold per ton. No. 2 stope, in back of Trinidad level, west of rise, has been stoped 7 varas; lode 3½ ft. wide, yielding 3 dwts. of gold per ton. No. 3 stope, in back of Trinidad level, west of rise, has been stoped 5 varas; lode 3 ft. wide, yielding 4 dwts. of gold per ton. No. 4 stope, in back of Trinidad level, west of rise, has been stoped 9 varas; lode 3 ft. wide, yielding 4 dwts. of gold per ton. No. 8 stope, in back of Trinidad level, west of rise, has been stoped 6 varas; lode 3½ ft. wide, yielding 6 dwts. of gold per ton. No. 9 stope, in back of Trinidad level, west of rise, has been stoped 6 varas; lode 3½ ft. wide, yielding 6 dwts. of gold per ton. No. 10 stope, in back of Trinidad level, has been stoped 4 varas; lode 3 ft. wide, yielding 5 dwts. of gold per ton. There has also been 14 varas stoped in back of the same level, east of Robert's rise, yielding 4 dwts. of gold per ton. There has also been a shaft sunk 7 varas, to communicate with No. 9 stope, east of Robert's rise; this shaft has well ventilated the mine, and has also enabled us to fill the stopes. The revolution that has taken place in the country has caused us a great deal of difficulty, also the constant heavy rain has prevented us from stoping, and sending a full supply of quartz to the mill—in fact, we have only stoped about half the ground this month that was stoped last month. Quartz sent to mill from Trinidad 408 tons, which I estimate at 5 dwts. of gold per ton; 100 tons from West San Benito, which I estimate at 5 dwts. of gold per ton: in all, I estimate it to be 427 ozs. of melted gold.—WM. EVANS.

FRONTINO AND BOLIVIA.—On Sept. 14, the directors received from Mr. Rouch the letters which ought to have come to hand on Aug. 31. The remittance of gold last month, although the largest yet made, was obtained notwithstanding the continuance of the drought at Remedios. The account of the cost and produce for June—719½ ozs. of gold dust, from 1606 tons of mineral stamped, average yield per ton 9 dwts., realised 1781*l.* 16s. 3d.; at Bolivia and Frontino Mines, and expenses in London and Medellin, 1436*l.* 3s. 6d.; net profit on month's working, 345*l.* 12s. 9d. Mr. Grieff, in his monthly report, states that the scantiness of water is nearly the same as in the past five months, excepting only a few days, when an occasional shower has supplied the mills with water for a few hours, but notwithstanding the want of water they have had increasing products in gold. It is impossible to give a detailed account of the work done—the operations in these mines are of a mixed and variable nature, alternately subterraneous and open air, so as to facilitate a better, cheaper, and more convenient system for their working at present, and to keep constant attention to easy access to the inner part of the mines in the future. At Mariadama a cross-cut is being put out in the lower part of the mine, by which they will be able to cut the lode in a few weeks, and in a point where its richness is evidently verified by the examinations made from Silencio upon the same lode. The Silencio Mine is nearly perfectly established, the mill working occasionally with 6, 9, or 12 heads, depending on the supply of water. The products in gold have been satisfactory, and are increasing. The auriferous lodes are found excessively abundant in ores, and partly uncommonly rich, the tunnel and the provisional road for wheel-barrows are completed, and the auxiliary watercourse may be ready in five or six days, when we shall have at all times plenty of water, not only for the mill at Silencio, but also for the new mills in the same locality, which are to be constructed for the service of both mines, San Joaquin and Silencio. The Salada, or San Joaquin Mine, is in a perfect state of working; the lode is abundant, and also very good, only the deficiency of water for the mills is to be deplored; but with the projected road to Silencio, and the new mills to be erected there, with a sufficient quantity of water-power, this mine may in a short time manifest its great value. The produce from the Juan Criollo Mine is constantly satisfactory, leaving commonly a profit of 100 per cent. on the cost paid. From the above facts it will be seen that the present position is satisfactory, and that a progressive improvement is to be expected.

Mr. Rouch concludes thus:—"It seems to me that, adopting the scheme proposed, we shall then have put the corner-stone to the future and permanent success of the company in the mines of Bolivia and Juan Criollo. The entire capital invested from the beginning of the company's undertakings may not be be quickly recovered, but in a comparatively short time the company will certainly obtain a satisfactory and successively increasing interest on its capital invested. I hope that our modest management of the company's business is highly prudent, and will be more profitable to the company than the loud-sounding promises daily published by so many other mining concerns." The agent at Frontino writes that the produce for the past month is 2147¼ castellanos. This is the highest produce he has yet had the pleasure of forwarding, and he has every reason to believe it will continue.

CAPULA.—Capt. Paull, Aug. 8: Since my last (27 ult.) torta No. 6 has been washed, and produced 276 marcs 6 ozs. (2214 ozs.), 18·44 marcs per morton, and assayed 20 marcs. The silver we shall send to Mexico on Wednesday, the 11th inst. Torta No. 7 was incorporated on the 3d inst. Torta No. 8, of the same quantity (15 montons), I trust will be incorporated this week. We have finished sending for No. 9, also of 15 montons, and have commenced sending for No. 10, which we shall complete next week, weather permitting.—The Mine: The ground has been very hard for opening the plat for the new level, 25 varas below adit; next week we shall commence the cross-cut. The whim round at the adit level is completed, and in order to be put up; I expect we shall get it to work during the week, and draw away the attle from the plat below. The lode in San Jorge rise has improved again during the week. I can see but very little alteration in any of the stopes since my last. The ground continues hard in the end driving west from La Bomba; there is still a narrow branch of good ore to the south.

[For remainder of Foreign Mines, see this day's Journal.]

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